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section a

general

This report presents information on scientists, engineers, and technicians (SET's) in Trade and Regulated Industries in 1982. The data come from the Occupational Employment Statistics (OES) Survey, a Federal/State program producing national, State, and local data on occupational employment by industry for nonfarm wage and salary workers. The Bureau of Labor Statistics (BLS) has primary responsibility for developing survey procedures and providing technical guidance. State Employment Security Agencies implement the survey at State and local levels and prepare current and projected employment statistics for these labor markets. BLS also conducts supplemental surveys in nonparticipating States, and then combines the data from all States into national estimates.

The National Science Foundation (NSF) has enhanced the BLS effort since 1977 by financing full coverage of SET occupations and data collection in nonparticipating States. Thus, the data yield reliable national estimates of the utilization of SET's by private industry. Analysis of this information provides insight into the dynamics of the labor market as SET requirements respond to variations in growth among industries, and to the impact of technology, and other factors, upon industry. Section C of this publication lists analytical reports and statistical data from OES surveys.

section b

technical notes

scope of the survey

The OES survey[1] is conducted in 3-year cycles: manufacturing industries are surveyed the first year; mining, construction, financial, and various service industries in the nonmanufacturing sector are surveyed in the second; and trade, communications, transportation, and public utilities (Trade and Regulated Industries in this report) in the third year. Data in this report, from the 1982 surveys of Trade and Regulated industries, are in Standard Industrial Classification (SIC) codes 40 through 59. The reference dates of the survey were the weeks that included April 12, May 12, or June 12, depending on the SIC of the sample unit. The survey covered all 50 States and the District of Columbia.

method of collection

Schedules for the OES survey were mailed to personnel offices of most sample establishments. Nonrespondents received two additional mailings at 6-week intervals, with telephone followups thereafter. Field personnel visited those companies essential to the survey because such companies have large absolute or relative employment within their industry.

Each industry surveyed received a questionnaire in which occupational detail was limited to primary work activities. Abbreviated survey forms, in which fields of specialization were combined, were sent to small establishments to diminish the reporting burden and to encourage participation. On the questionnaires the specific occupations were grouped under broad Census headings, each with a residual category for work functions not explicitly listed on the survey form. Each respondent was asked to identify any occupations in the residual categories for which employment levels were significant; surveys in subsequent years will be revised to include such jobs explicitly.

limitations on analysis

Data collection methodology in the OES survey introduces several problems that should be taken into account when interpreting these data. First, the OES survey tends to understate requirements in specific fields. Second, this same survey characteristic can be expected to overstate cross-industry differences in staffing patterns: the finer the detail, the more serious the problem. This occurs because an occupation will be listed explicitly on an industry's questionnaire only if it is judged to be a major job class; otherwise, it is put into a residual category.

occupational and industrial classification

The OES survey collects data for approximately 110 SET occupations and uses two classifications systems—the Dictionary of Occupational Titles (DOT) and the 1980 Census of Population. The DOT system is used to develop occupational categories and definitions because its classification scheme is detailed. Summary categories and residual groups are comparable to the broader categories used in the Census.

Industries surveyed were classified according to the 1972 SIC codes. Reporting establishments were categorized on the basis of major product or activity for the previous calendar year.

concepts

An establishment, such as a factory, is the primary sampling unit in the survey. In general, it represents a single physical location and engages primarily in one type of economic activity. When several distinct activities are performed in one location, each is construed as being performed in an individual establishment, assuming that separate payroll records and other criteria are met.

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[1] A description of the OES Survey can be found in Department of Labor, Bureau of Labor Statistics, Occupational Employment Statistics Handbook (Washington, D.C.: Supt. of Documents, U.S. Government Printing Office, April 1979)

This report covers several types of personnel: Full- and part-time workers; workers on paid vacation or on other types of leave; workers on unpaid short-term absence; salaried officers, executives, and staff of unincorporated firms; employees temporarily assigned to other units; and employees for whom the unit is their permanent duty station. Excluded from coverage are proprietors (owners and partners of unincorporated firms), unpaid family workers, and workers on extended leave.

Occupation means the work employees do, rather than the field for which they trained. Skilled personnel are an exception when engaged in the sale of scientific and engineering (S/E) equipment: such personnel are categorized in terms of their fields of specialization. To categorize one as a scientist or engineer requires work at a level of knowledge equivalent to that acquired by completion of a 4-year college course with a major in that field, regardless of whether a college degree was ever obtained. Employees who perform multiple functions are reported only in the job believed to require the highest skill level. Supervisors who spend more than one-fifth of their time doing work similar to that of individuals under their supervision are classified in the occupation most closely related to their work duties.

sampling procedures

The OES survey is a probability sample with a sampling frame based on lists of establishments covered by State Unemployment Insurance (U.I.) systems. Because each cooperating State selects its own sample, the reference date of the sampling frame varies by date when the last sample frame was updated and the survey was conducted. The reference date for sampling in the three States surveyed by BLS for the 1982 survey was the first quarter of 1982.

The survey universe is stratified by industry and size of establishment unit since these characteristics are believed to be primary determinants of occupational staffing patterns. Nine size classes were represented, based on the numbers of people employed: 1 to 3, 4 to 9, 10 to 19, 20 to 49, 50 to 99, 100 to 249, 250 to 499, 500 to 999, and 1,000 and over.

U.I. reporting units with 1 to 3 employees were not sampled in every State. In this instance, units with 4 to 9 employees received larger weights to represent employment in the 1 to 3 size class. Reporting units with 250 or more employees were included in the sample with certainty. Samples for noncertainty size classes were developed to produce State estimates with target relative errors of 10 percent, 15 percent, and 20 percent at one standard deviation for the noncertainty size classes. This was done for groups of SIC's based on averages of occupational rates and coefficients of variation (CV's) from the previous survey of those SIC's for a set of typical occupations. This SIC sample size was allocated to the size classes proportional to size class employment. The sample was selected systematically with equal probability within each State/SIC/area/size class cell.

The States chose from any of three target relative errors in designing their samples. Some States varied the target relative error by SIC. This decreased the survey's cost by decreasing the sample size.

The sample size for the States surveyed by BLS was developed by first determining the sample size required for national estimates in each 2-digit SIC with a target relative error of 10 percent. This was done by averaging CV's and occupational rates for a set of occupations from the previous survey of those SIC's. This national sample size was then allocated to the three nonparticipating States' size class cells proportionally by employment. Such allocation produced a total initial sample size of 239,580 U.I. reporting units.

response

Of the reporting units selected, 228,244 were eligible (i.e., excluding those out of business and out of scope). Usable responses were obtained from 170,698 units. The response rates were 74.8 percent based on units and 73.8 percent based on weighted employment. After the closeout date for national estimates, additional data were received by States and used in preparing State estimates. Response rates in most States were much higher than the response rate used to develop national estimates.

estimation

Weights were determined for the sample units from which usable responses were received. Each weight was composed of two factors. The first was the inverse of the probability of selection. The second was the nonresponse adjustment factor. For questionnaires that were not returned or were otherwise not usable, a reponse adjustment was made to impute for the nonrespondents. For each of the 3-digit State/SIC/size class sampling cells, a nonresponse factor was calculated that was equal to:

$$\frac{\text{Weighted sample employment of all eligible units in sample}}{\text{Weighted sample employment of all responding eligible units}}$$

The sample employments were taken from the sampling frame. If the nonresponse factor in a cell was greater than a predetermined maximum factor—which increased as the number of respondents in a cell increased—the cell was collapsed with other homogeneous cells within an SIC until the factor for the combined cells was not greater than the appropriate maximum factor. If the collapsing procedure terminated (i.e., no more cells were available for collapse) before satisfying the constraint, then the appropriate maximum factor was used. For size classes 1 through 6, homogeneous cells were determined to be other size cells within the SIC and State. For size classes 7 through 9, homogeneous cells were determined to be other State cells within the SIC and size class. The weight for each unit was the product of the nonresponse adjustment factor and probability of selection.

A combined ratio estimate of occupational employment was used to develop the national estimates. The auxiliary variable used was total employment. The estimating formula was:

$$\dot{P} = \sum_{j} \left(\frac{\sum_{i} \sum_{k} w_{ijk}\, p_{ijk}}{\sum_{i} \sum_{k} w_{ijk}\, e_{ijk}} \right) M_j$$

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Where P = 2-digit industry occupational employment estimate,
i = 3-digit industry within a 2-digit industry,
j = size class,
k = establishment,
w_{ijk} = weight after nonresponse adjustment in ith industry, jth size class and kth establishment,
P_{ijk} = occupational employment in ith industry, jth size class and kth establishment,
e_{ijk} = total employment in ith industry, jth size class and kth establishment, and
M_i = population total value of employment in ith industry

The population value of total employment (Mi) was obtained from the BLS Survey of Employment, Hours, and Earnings.

The standard formula for the sampling variance for a combined ratio estimate is:

$$V(\hat{P}) = \sum_i \sum_j \left(\frac{N_{ij}^2(1-f_{ij})}{n_{ij}} \right) (S^2_{pij} + R_i^2 S^2_{eij} - 2K_{ij} S_{pij} S_{eij})$$

where $V(\hat{P})$ = variance of $\hat{P}$
i = 3-digit industry within 2-digit industry,
j = size class,
N_{ij} = total number of units in the ith industry and jth size class,
f_{ij} = sampling fraction in the ith industry and jth size class,
n_{ij} = number of sample units in the ith industry and jth size class,
S_{pij} = standard deviation of p within ith industry and jth size class,
R_i = $(\sum_j \sum_k w_{ijk} p_{ijk}) / (\sum_j \sum_k w_{ijk} e_{ijk})$,
S_{eij} = standard deviation of e within ith industry and jth size class, and
K_{ij} = correlation coefficient between p and e within ith industry and jth size class.

The variances for the occupational estimates were estimated using the following formula:

$$\text{Var}(\hat{P}) = \sum_i \sum_j T_{ij} \hat{V}_{ij}^2$$

where,

$$T_{ij} = \left(\frac{M_{ij} - e_{ij}}{M_{ij}} \right) \cdot \left(\frac{(\sum_k w^2_{ijk})(\sum_k w_{ijk})}{(\sum_k w_{ijk})^2 - (\sum_k w^2_{ijk})} \right) \cdot \left(\frac{M_i}{\sum_j \sum_k w_{ijk} e_{ijk}} \right)^2$$

$$\hat{V}_{ij}^2 = \sum_k w_{ijk} [(p_{ijk} - R_i e_{ijk}) - (p_{ij} - R_i e_{ij})]^2$$

where M_{ij} = benchmark total employment in the ith industry and jth size class,
R_i = $(\sum_j \sum_k w_{ijk} p_{ijk}) / (\sum_j \sum_k w_{ijk} e_{ijk})$, and
e_{ij} = $\sum_k e_{ijk}$.

and all other terms are as defined previously. This formula is almost a computational form of the standard formula, V($\hat{P}$), already given. One simplifying assumption has been made:

$$W_{ijk} = c_{ij} \text{ for all k in a given ij cell}$$

That is, the weights are equal to a constant C within a given 3-digit industry/size class cell. The total effect of this assumption on the variance estimates was not measured.

reliability of estimates

The estimates developed from the sample may differ from the results of a census of all the establishments in the sample frame. There are two types of errors, sampling and nonsampling, possible in an estimate based on sample data. Sampling error occurs because observations are made only on a sample, not on the entire population. Nonsampling error can be attributed to many sources, e.g., inability to obtain information about all cases in a sample, differences in the respondent's interpretation of questions, inability of respondents to provide correct information, errors made in recording, coding, or processing the data, errors made in estimating values for missing data, and failure to represent all units in the population.

The particular sample used in this survey is one of a large number of possible samples of the same size that could have been selected using the same sample design. Estimates derived from the different samples would differ from each other. The deviation of a sample estimate from the average of all possible samples is called the sampling error. The standard error of a survey estimate is a measure of the variation among the estimates from all possible samples and thus is a measure of the precision with which an estimate from a particular sample approximates the average results of all possible samples. The relative standard error is defined as the standard error of the estimate divided by the value being estimated. The variance is the standard error squared. (In the OES Survey, the term "relative error" is used synonymously with the term "relative standard error.")

The sample estimate and an estimate of its standard error enables one to construct interval estimates with prescribed confidence that the interval includes the average result of all possible samples that could be obtained from the sample design for this survey.

To illustrate, if all possible samples were selected, and each of these were surveyed under essentially the same conditions, and an estimate and its estimated standard error were calculated from each sample, then:

1. Approximately 68 percent of the intervals from one standard error below to one standard error above the derived estimate would include the average value of all possible samples. This interval is called a 68-percent confidence interval.
2. Approximately 90 percent of the intervals from 1.6 standard errors below to 1.6 standard errors above the derived estimate would include the average of all possible samples. This interval is called a 90-percent confidence interval.

3. Approximately 95 percent of the intervals from two standard errors below to two standard errors above the derived estimate would include the average of all possible samples. This interval is called the 95-percent confidence interval.
4. Almost all intervals from three standard errors below to three standard errors above the derived estimate would include the average of all possible samples.

An inference that the complete coverage would be within the indicated ranges would be correct in approximately the relative frequencies shown.

For example, suppose an estimated employment total is shown as 5,000 with an associated relative error (relative standard error) of 2 percent. Based on these data, the two-thirds confidence interval is from 4,900 to 5,100 employment, and a conclusion that the average estimate of total employment lies within a range computed in this way would be correct for roughly two-thirds of all possible samples.

The relative errors indicate primarily the magnitude of the sampling error, but do not measure biases in the data resulting from nonsampling error. Efforts were made to reduce the biases arising from errors in recording, coding, and processing the data. The adjustments made for nonrespondents assumed that their characteristics were the same as those of the respondents at a given level. To the extent that this is not true, bias is introduced into the data. The magnitude of these biases is unknown.

Particular care should be exercised in the interpretation of estimates based on a small number of cases, or on small differences between estimates, because of relatively large sampling errors and the unknown magnitude of the biases.

section c

detailed statistical tables

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TABLE C-1. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN TRADE AND REGULATED INDUSTRIES BY MAJOR OCCUPATIONAL GROUP AND DETAILED INDUSTRY OF EMPLOYMENT: 1982

[Numbers in thousands]

Industry	Scientists, engineers, and technicians							
	Total	Percent	Scientists	Percent	Engineers	Percent	Technicians	Percent
Total trade and regulated industries	425.1	100.0	47.2	100.0	117.2	100.0	260.8	100.0
Transportation, communications, and utilities	217.5	51.2	17.8	37.6	81.3	69.4	118.5	45.4
Transportation	16.1	3.8	3.3	6.9	5.6	4.8	7.2	2.8
Local and interurban transit	.3	.1	-	-	-	-	.3	.1
Local and suburban transportation	-	-	-	-	-	-	-	-
Taxicabs	.2	(1)	-	-	-	-	.2	.1
Intercity and rural highway transportation	.1	(1)	-	-	-	-	.1	(1)
Transportation charter service	(1)	(1)	-	-	-	-	(1)	(1)
School buses	(1)	(1)	-	-	-	-	(1)	(1)
Terminals and services for motor vehicle transportation	(1)	(1)	-	-	-	-	(1)	(1)
Trucking and warehousing	2.5	.6	.5	1.0	.7	.6	1.3	.5
Trucking, local and long distance	2.0	.5	.5	1.0	.5	.4	1.1	.4
Public warehousing	.4	.1	-	-	.2	.2	.2	.1
Trucking terminal facilities	-	-	-	-	-	-	-	-
Water transportation	3.0	.7	.1	.3	1.9	1.6	1.0	.4
Deep sea foreign transportation	.6	.2	.1	.3	.4	.3	.1	(1)
Deep sea domestic transportation	.1	(1)	-	-	.1	.1	-	-
Great Lakes transportation	(1)	(1)	-	-	-	-	(1)	(1)
Transportation on rivers and canals	.2	(1)	-	-	.2	.1	-	-
Local water transportation	.6	.2	-	-	.6	.5	-	-
Water transportation services	1.4	.3	-	-	.6	.5	.8	.3
Air transportation	6.5	1.5	2.1	4.5	1.5	1.3	2.9	1.1
Certificated air transportation	5.8	1.4	2.1	4.5	1.3	1.1	2.4	.9
Noncertificated air transportation	-	-	-	-	-	-	-	-
Air transportation facilities and services	.7	.2	-	-	.1	.1	.5	.2
Pipelines, except natural gas	2.8	.7	.3	.6	1.3	1.1	1.2	.5
Pipelines, except natural gas	2.8	.7	.3	.6	1.3	1.1	1.2	.5
Transportation services	1.0	.2	.2	.5	.3	.2	.5	.2
Freight forwarding	.3	.1	.1	.3	-	-	.2	.1
Arrangement of transportation	.3	.1	.1	.2	.1	.1	.1	.1
Rental of railroad cars	.1	(1)	-	-	-	-	.1	(1)
Miscellaneous transportation services	.3	.1	-	-	.1	.1	.1	(1)
Communications and utilities	201.4	47.4	14.5	30.7	75.7	64.6	111.3	42.7
Communications	105.0	24.7	5.8	12.2	33.1	28.2	66.1	25.4
Telephone communication	52.7	12.4	5.1	10.8	22.4	19.2	25.2	9.7
Telegraph communication	4.3	1.0	-	-	.4	.3	4.0	1.5
Radio and television broadcasting	29.4	6.9	.4	.8	7.1	6.1	21.8	8.4
Communication services, n.e.c.	18.6	4.4	.3	.6	3.2	2.7	15.1	5.8

See footnotes at end of table.

TABLE C-1. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN TRADE AND REGULATED INDUSTRIES BY MAJOR OCCUPATIONAL GROUP AND DETAILED INDUSTRY OF EMPLOYMENT: 1982--con.
[Numbers in thousands]

Industry	Scientists, engineers, and technicians							
	Total	Percent	Scientists	Percent	Engineers	Percent	Technicians	Percent
Utilities and sanitary services	96.4	22.7	8.7	18.5	42.6	36.3	45.1	17.3
Electric services	58.4	13.7	4.6	9.7	26.8	22.8	27.1	10.4
Gas production and distribution	12.1	2.8	1.6	3.4	3.8	3.3	6.6	2.5
Combination electric and gas, and other utilities	24.6	5.8	2.4	5.0	11.2	9.6	11.0	4.2
Water supply	.5	.1	.1	.1	.2	.2	.2	.1
Sanitary services	.8	.2	.1	.2	.5	.5	.2	.1
Steam supply	(1)	(1)	-	-	-	-	(1)	(1)
Irrigation systems	-	-	-	-	-	-	-	-
Wholesale and retail trade	207.6	48.8	29.4	62.4	35.9	30.6	142.3	54.6
Wholesale trade	193.9	45.6	26.6	56.4	34.9	29.8	132.4	50.8
Wholesale trade, durable goods	174.5	41.0	21.5	45.7	31.6	27.0	121.3	46.5
Motor vehicles and auto parts and supplies	4.3	1.0	.6	1.4	1.7	1.5	1.9	.7
Furniture and home furnishings	.4	.1	.1	.1	-	-	.4	.1
Lumber and other construction materials	1.5	.3	.1	.3	.4	.3	.9	.4
Sporting, toy, photographic, and hobby goods	1.8	.4	-	-	.1	.1	1.7	.7
Metals and minerals, except petroleum	2.8	.7	.3	.6	1.1	.9	1.5	.6
Electrical goods	43.2	10.2	1.0	2.1	9.5	8.1	32.6	12.5
Hardware/plumbing/heating equipment and supplies	4.9	1.2	.3	.6	1.9	1.6	2.8	1.1
Machinery, equipment, and supplies	113.8	26.8	19.0	40.3	16.2	13.8	78.6	30.2
Miscellaneous durable goods	1.8	.4	.1	.3	.8	.7	.9	.3
Wholesale trade, nondurable goods	19.4	4.6	5.1	10.7	3.3	2.8	11.0	4.2
Paper and paper products	1.1	.3	.1	.2	.2	.2	.8	.3
Drugs, proprietaries, and sundries	1.4	.3	.3	.6	.2	.2	.9	.3
Apparel, piece goods, and notions	.7	.2	.2	.3	.1	.1	.5	.2
Groceries and related products	3.4	.8	.8	1.6	.3	.3	2.3	.9
Farm-product raw materials	.8	.2	.4	.8	.1	.1	.4	.1
Chemicals and allied products	4.6	1.1	.9	1.8	1.3	1.1	2.4	.9
Petroleum and petroleum products	3.3	.8	.9	1.9	1.0	.8	1.4	.5
Beer, wine, and distilled alcoholic beverages	.9	.2	.4	.8	-	-	.6	.2
Miscellaneous nondurable goods	3.2	.8	1.2	2.6	.1	.1	1.8	.7
Retail trade	13.7	3.2	2.8	6.0	1.0	.8	9.9	3.8
Building materials, garden supplies, mobile homes	.8	.2	-	-	.1	.1	.7	.3
Lumber and other building materials dealers	.6	.1	-	-	.1	.1	.5	.2
Paint, glass, and wallpaper stores	(1)	(1)	-	-	-	-	(1)	(1)
Hardware stores	.1	(1)	-	-	-	-	.1	(1)
Retail nurseries, lawn and garden supply stores	.1	(1)	-	-	-	-	.1	(1)
Mobile home dealers	(1)	(1)	-	-	-	-	(1)	(1)
General merchandise stores	4.7	1.1	1.4	2.9	.4	.3	2.9	1.1

See footnotes at end of table.

TABLE C-1. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN TRADE AND REGULATED INDUSTRIES BY MAJOR OCCUPATIONAL GROUP AND DETAILED INDUSTRY OF EMPLOYMENT: 1982--con.

[Numbers in thousands]

Industry	Scientists, engineers, and technicians							
	Total	Percent	Scientists	Percent	Engineers	Percent	Technicians	Percent
Department stores	4.1	1.0	1.2	2.6	0.4	0.3	2.5	0.9
Variety stores	.5	.1	.1	.2	-	-	.4	.2
Miscellaneous general merchandise stores	.1	(1)	.1	.1	-	-	.1	(1)
Food stores	2.0	.5	.6	1.3	.3	.2	1.1	.4
Grocery stores	1.8	.4	.6	1.3	.3	.2	.9	.3
Meat and fish (seafood) markets	-	-	-	-	-	-	-	-
Fruit stores and vegetable markets	-	-	-	-	-	-	-	-
Candy, nut, and confectionery stores	.2	(1)	-	-	-	-	.2	.1
Dairy products stores	-	-	-	-	-	-	-	-
Retail bakeries	-	-	-	-	-	-	-	-
Miscellaneous food stores	-	-	-	-	-	-	-	-
Automotive dealers and gasoline service stations	.7	.2	-	-	-	-	.7	.3
Motor vehicle dealers (new and used)	.1	(1)	-	-	-	-	.1	(1)
Motor vehicle dealers (used only)	-	-	-	-	-	-	-	-
Auto and home supply stores	.2	.1	-	-	-	-	.2	.1
Gasoline service stations	.1	(1)	-	-	-	-	.1	.1
Boat dealers	.1	(1)	-	-	-	-	.1	(1)
Recreational and utility trailer dealers	-	-	-	-	-	-	-	-
Motorcycle dealers	-	-	-	-	-	-	-	-
Automotive dealers, n.e.c	.1	(1)	-	-	-	-	.1	.1
Apparel and accessories stores	.6	.1	.2	.4	-	-	.4	.2
Men's and boy's clothing stores	(1)	(1)	-	-	-	-	(1)	(1)
Women's ready-to-wear stores	.3	.1	.1	.2	-	-	.2	.1
Women's accessory and specialty stores	-	-	-	-	-	-	-	-
Children's and infants' wear stores	(1)	(1)	-	-	-	-	(1)	(1)
Family clothing stores	.2	.1	.1	.2	-	-	.1	(1)
Shoe stores	.1	(1)	-	-	-	-	.1	(1)
Furriers and fur shops	-	-	-	-	-	-	-	-
Miscellaneous apparel and accessories stores	-	-	-	-	-	-	-	-
Furniture and home furnishings stores	1.8	.4	-	-	-	-	1.8	.7
Furniture and home furnishings, except appliances	.2	(1)	-	-	-	-	.2	.1
Household appliance stores	.1	(1)	-	-	-	-	.1	(1)
Radio, television, and music stores	1.5	.4	-	-	-	-	1.5	.6
Eating and drinking places	.5	.1	-	-	-	-	.5	.2
Eating and drinking places	.5	.1	-	-	-	-	.5	.2
Miscellaneous retail stores	2.6	.6	.6	1.3	.2	.2	1.7	.7
Drug stores and proprietary stores	.2	(1)	.1	.1	-	-	.1	(1)
Liquor stores	.1	(1)	-	-	-	-	.1	(1)

See footnotes at end of table.

TABLE C-1. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN TRADE AND REGULATED INDUSTRIES
BY MAJOR OCCUPATIONAL GROUP AND DETAILED INDUSTRY OF EMPLOYMENT: 1982--con.
[Numbers in thousands]

Industry	Scientists, engineers, and technicians							
	Total	Percent	Scientists	Percent	Engineers	Percent	Technicians	Percent
Used merchandise stores	(1)	(1)	-	-	-	-	(1)	(1)
Miscellaneous shopping goods stores	0.4	0.1	0.2	0.4	-	-	0.3	0.1
Nonstore retailers	1.0	.2	.4	.8	0.1	0.1	.4	.2
Fuel and ice dealers	.2	(1)	-	-	.1	.1	.1	(1)
Retail stores, n.e.c	.7	.2	-	-	-	-	.7	.3

- No amount available
(1) Value is less than .05 for numbers and less than .005 for percents.
NOTE: Because of rounding, components may not add to totals.
SOURCES: Bureau of Labor Statistics and the National Science Foundation.

TABLE C-2. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN TRADE AND REGULATED INDUSTRIES, BY DETAILED OCCUPATION AND BROAD INDUSTRY GROUP OF EMPLOYMENT: 1982

[Numbers in thousands]

Industry	All fields	Scientists							Engineers					
		Total	Physical	Mathematical	Life	Social	Computer analyst	Other	Total	Aeronautical	Chemical	Civil	Elec/ Electronic	Mechanical
Total trade and regulated industries	425.1	47.2	2.0	1.4	1.0	0.4	39.0	3.4	117.2	0.5	1.3	5.3	52.4	15.6
Transportation, communications, and utilities	217.5	17.8	-	-	-	.4	13.9	3.4	81.3	.5	1.2	5.3	40.8	6.6
Transportation	16.1	3.3	-	-	-	-	3.0	.2	5.6	.5	-	.2	.5	1.0
Local and interurban transit	.3	-	-	-	-	-	-	-	-	-	-	-	-	-
Trucking and warehousing	2.5	.5	-	-	-	-	.5	-	.7	-	-	-	-	-
Water transportation	3.0	.1	-	-	-	-	.1	-	1.9	-	-	-	-	.5
Air transportation	6.5	2.1	-	-	-	-	2.0	.1	1.5	.5	-	-	.2	-
Pipelines, except natural gas	2.8	.3	-	-	-	-	.2	.1	1.3	-	-	.2	.3	.5
Transportation services	1.0	.2	-	-	-	-	.2	-	.3	-	-	-	-	-
Communications and utilities	201.4	14.5	-	-	-	.4	10.9	3.2	75.7	-	1.2	5.0	40.4	5.6
Communications	105.0	5.8	-	-	-	.4	5.2	.1	33.1	-	-	1.2	21.5	.7
Utilities and sanitary services	96.4	8.7	-	-	-	-	5.7	3.0	42.6	-	1.2	3.8	18.8	4.9
Wholesale and retail trade	207.6	29.4	2.0	1.4	1.0	-	25.0	-	35.9	-	.1	-	11.5	9.0
Wholesale trade	193.9	26.6	2.0	1.0	1.0	-	22.6	-	34.9	-	.1	-	11.5	9.0
Wholesale trade, durable goods	174.5	21.5	.2	.6	-	-	20.7	-	31.6	-	-	-	11.5	8.4
Wholesale trade, nondurable goods	19.4	5.1	1.8	.4	1.0	-	1.8	-	3.3	-	.1	-	-	.6
Retail trade	13.7	2.8	-	.4	-	-	2.4	-	1.0	-	-	-	-	-
Building materials, garden supplies, mobile homes	.8	-	-	-	-	-	-	-	.1	-	-	-	-	-
General merchandise stores	4.7	1.4	-	.2	-	-	1.2	-	.4	-	-	-	-	-
Food stores	2.0	.6	-	-	-	-	.6	-	.3	-	-	-	-	-
Automotive dealers and gasoline service stations	.7	-	-	-	-	-	-	-	-	-	-	-	-	-
Apparel and accessories stores	.6	.2	-	-	-	-	.2	-	-	-	-	-	-	-
Furniture and home furnishings stores	1.8	-	-	-	-	-	-	-	-	-	-	-	-	-
Eating and drinking places	.5	-	-	-	-	-	-	-	-	-	-	-	-	-
Miscellaneous retail stores	2.6	.6	-	.2	-	-	.4	-	.2	-	-	-	-	-

See footnotes at end of table.

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TABLE C-2. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN TRADE AND REGULATED INDUSTRIES, BY DETAILED OCCUPATION AND BROAD INDUSTRY GROUP OF EMPLOYMENT: 1982--con.

[Numbers in thousands]

Industry	Engineers		Technicians						
	Industrial	Other	Total	Programmer	Drafter	Engineering	Science	Unspecified	Other
Total trade and regulated industries	6.4	35.7	260.8	40.4	19.6	171.5	6.1	1.8	21.3
Transportation, communications, and utilities	6.4	20.5	118.5	16.3	13.8	63.6	2.8	.5	21.3
Transportation	.3	3.1	7.2	3.2	.3	3.2	-	.5	-
Local and interurban transit	-	-	.3	-	-	-	-	.3	-
Trucking and warehousing	-	.7	1.3	1.1	-	.2	-	-	-
Water transportation	-	1.4	1.0	.2	-	.7	-	(1)	-
Air transportation	.3	.5	2.9	1.5	-	1.3	-	-	-
Pipelines, except natural gas	-	.2	1.2	-	.3	.9	-	-	-
Transportation services	-	.3	.5	.3	-	-	-	.2	-
Communications and utilities	6.1	17.4	111.3	13.1	13.6	60.4	2.8	(1)	21.3
Communications	3.9	5.7	66.1	8.1	6.3	30.4	-	-	21.3
Utilities and sanitary services	2.2	11.6	45.1	5.1	7.2	30.0	2.8	(1)	-
Wholesale and retail trade	-	15.2	142.3	24.1	5.7	107.9	3.3	1.2	-
Wholesale trade	-	14.3	132.4	19.5	5.0	104.5	3.3	-	-
Wholesale trade, durable goods	-	11.6	121.3	15.4	4.8	100.1	1.0	-	-
Wholesale trade, nondurable goods	-	2.6	11.0	4.1	.2	4.5	2.3	-	-
Retail trade	-	1.0	9.9	4.6	.7	3.4	-	1.2	-
Building materials, garden supplies, mobile homes	-	.1	.7	.2	.4	-	-	.1	-
General merchandise stores	-	.4	2.9	2.0	.3	.6	-	-	-
Food stores	-	.3	1.1	.6	-	.3	-	.2	-
Automotive dealers and gasoline service stations	-	-	.7	.1	-	.1	-	.4	-
Apparel and accessories stores	-	-	.4	.3	-	-	-	.1	-
Furniture and home furnishings stores	-	-	1.8	.1	-	1.6	-	.1	-
Eating and drinking places	-	-	.5	.5	-	-	-	-	-
Miscellaneous retail stores	-	.2	1.7	.7	-	.8	-	.2	-

- No amount available

(1) Value is less than .05.

NOTE: Because of rounding, components may not add to totals.

SOURCES: Bureau of Labor Statistics and the National Science Foundation.

TABLE C-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN TRADE AND REGULATED INDUSTRIES AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRIES, AND THE RELATIVE ERROR: 1982

Taxicabs (SIC 4120)

Field	Total	Percent of industry employment	Relative error
Total	160	0.37	(1)
Technicians	160	.37	(1)
Field unspecified	160	.37	(1)

Intercity and rural highway transportation (SIC 4130)

Field	Total	Percent of industry employment	Relative error
Total	100	0.25	(1)
Technicians	100	.25	(1)
Field unspecified	100	.25	(1)

See footnotes at end of table.

TABLE C-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN TRADE AND REGULATED INDUSTRIES AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRIES, AND THE RELATIVE ERROR: 1982--con.

Trucking, local and long distance (SIC 4210)

Field	Total	Percent of industry employment	Relative error
Total	2,050	0.17	(1)
Engineers	480	.04	(1)
Field unspecified	480	.04	14.07
Scientists	490	.04	(1)
Systems analysts	490	.04	12.69
Technicians	1,080	.09	(1)
Computer programmer	930	.08	11.63
Engineering technicians	150	.01	28.12

Public warehousing (SIC 4220)

Field	Total	Percent of industry employment	Relative error
Total	420	0.50	(1)
Engineers	190	.23	(1)
Field unspecified	190	.23	47.93
Technicians	230	.27	(1)
Computer programmer	150	.18	28.66
Engineering technicians	80	.09	.00

See footnotes at end of table.

TABLE C-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN TRADE AND REGULATED INDUSTRIES AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRIES, AND THE RELATIVE ERROR: 1982--con.

Deep sea foreign transportation (SIC 4410)

Field	Total	Percent of industry em-ploy-ment	Relative error
Total	640	1.93	(1)
Engineers	390	1.18	(1)
Marine	300	.91	16.43
Other, n.e.c.	90	.27	.00
Scientists	130	.39	(1)
Systems analysts	130	.39	26.43
Technicians	120	.36	(1)
Computer programmer	120	.36	16.66

Deep sea domestic transportation (SIC 4420)

Field	Total	Percent of industry em-ploy-ment	Relative error
Total	130	0.97	(1)
Engineers	130	.97	(1)
Marine	130	.97	17.19

See footnotes at end of table.

TABLE C-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN TRADE AND REGULATED INDUSTRIES AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRIES, AND THE RELATIVE ERROR: 1982--con.

Transportation on rivers and canals (SIC 4440)

Field	Total	Percent of industry em-ploy-ment	Relative error
Total	170	0.98	(1)
Engineers	170	.98	(1)
Marine	90	.52	14.26
Mechanical	80	.46	46.48

Local water transportation (SIC 4450)

Field	Total	Percent of industry em-ploy-ment	Relative error
Total	640	2.01	(1)
Engineers	640	2.01	(1)
Marine	310	.97	18.21
Other, n.e.c	330	1.04	.00

See footnotes at end of table.

TABLE C-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN TRADE AND REGULATED INDUSTRIES AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRIES, AND THE RELATIVE ERROR: 1982--con.

Water transportation services (SIC 4460)

Field	Total	Percent of industry em-ploy-ment	Relative error
Total	1,390	1.18	(1)
Engineers	570	.48	(1)
Marine	170	.14	33.55
Mechanical	400	.34	23.15
Technicians	820	.70	(1)
Computer programmer	90	.07	23.75
Surveyor	730	.63	30.05

Certificated air transportation (SIC 4510)

Field	Total	Percent of industry em-ploy-ment	Relative error
Total	5,820	1.56	(1)
Engineers	1,340	.34	(1)
Aeronautical	550	.15	17.15
Electrical/electronic	180	.04	22.21
Industrial	250	.06	18.67
Other, n.e.c.	360	.09	.00
Scientists	2,110	.57	(1)
Field unspecified	140	.03	17.31
Systems analysts	1,970	.54	17.24
Technicians	2,370	.65	(1)
Computer programmer	1,550	.43	18.60
Electrical/electronic technicians	440	.12	23.03
All other engineering technicians	380	.10	(1)

See footnotes at end of table.

TABLE C-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN TRADE AND REGULATED INDUSTRIES AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRIES, AND THE RELATIVE ERROR: 1982--con.

Air transportation facilities and services (SIC 4580)

Field	Total	Percent of industry employment	Relative error
Total	670	1.31	(1)
Engineers	150	.29	(1)
Field unspecified	150	.29	0.00
Technicians	520	1.02	(1)
Electrical/electronic technicians	520	1.02	23.49

Pipelines, except natural gas (SIC 4600)

Field	Total	Percent of industry employment	Relative error
Total	2,780	12.26	(1)
Engineers	1,290	5.69	(1)
Civil	240	1.06	16.10
Electrical/electronic	280	1.23	14.48
Mechanical	520	2.30	10.53
Safety	60	.26	16.07
Other, n.e.c.	190	.84	.00
Scientists	300	1.32	(1)
Field unspecified	80	.35	44.15
Systems analysts	220	.97	23.16
Technicians	1,190	5.25	(1)
Drafter	250	1.10	10.64
Electrical/electronic technicians	710	3.14	9.44
All other engineering technicians	230	1.01	(1)

See footnotes at end of table.

TABLE C-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN TRADE AND REGULATED INDUSTRIES AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRIES, AND THE RELATIVE ERROR: 1982--con.

Freight forwarding (SIC 4710)

Field	Total	Percent of industry employment	Relative error
Total	330	0.61	(1)
Scientists	150	.28	(1)
Systems analysts	150	.28	27.36
Technicians	180	.33	(1)
Computer programmer	180	.33	19.69

Arrangement of transportation (SIC 4720)

Field	Total	Percent of industry employment	Relative error
Total	340	0.22	(1)
Engineers	120	.08	(1)
Field unspecified	120	.08	0.00
Scientists	80	.05	(1)
Systems analysts	80	.05	26.34
Technicians	140	.09	(1)
Computer programmer	140	.09	15.47

See footnotes at end of table.

TABLE C-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN TRADE AND REGULATED INDUSTRIES AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRIES, AND THE RELATIVE ERROR: 1982--con.

Miscellaneous transportation services (SIC 4780)

Field	Total	Percent of industry employment	Relative error
Total	270	1.51	(1)
Engineers	150	.84	(1)
Field unspecified	150	.84	34.09
Technicians	120	.67	(1)
Field unspecified	120	.67	(1)

Telephone communication (SIC 4810)

Field	Total	Percent of industry employment	Relative error
Total	52,730	4.83	(1)
Engineers	22,440	2.05	(1)
Civil	1,210	.11	22.33
Electrical/electronic	12,600	1.16	10.81
Industrial	3,750	.34	18.22
Mechanical	720	.06	21.23
Other, n.e.c	4,160	.38	.00
Scientists	5,100	.46	(1)
Field unspecified	150	.01	29.53
Economists	330	.03	39.56
All other social scientists	110	.01	.00
Systems analysts	4,510	.41	16.75
Technicians	25,190	2.32	(1)
Computer programmer	7,260	.67	17.07
Drafter	5,840	.54	10.53
Electrical/electronic technicians	8,670	.80	12.23
Industrial engineering technicians	360	.03	27.95
All other engineering technicians	3,060	.28	(1)

See footnotes at end of table.

TABLE C-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN TRADE AND REGULATED INDUSTRIES AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRIES, AND THE RELATIVE ERROR: 1982--con.

Radio and television broadcasting (SIC 4830)

Field	Total	Percent of industry em- ploy- ment	Relative error
Total	29,360	13.35	(1)
Engineers	7,120	3.24	(1)
Electrical/electronic	6,120	2.79	6.25
Other, n.e.c.	1,000	.45	.00
Scientists	390	.17	(1)
Systems analysts	390	.17	38.97
Technicians	21,850	9.94	(1)
Computer programmer	290	.13	31.70
Electrical/electronic technicians	1,180	.53	18.49
Sound recording and reproduction technician	520	.23	21.29
Video-recording engineer	1,100	.50	27.27
Broadcast technician	18,140	8.28	6.46
Light technician	370	.16	18.97
All other engineering technicians	250	.11	(1)

Telegraph communication (SIC 4820)

Field	Total	Percent of industry em- ploy- ment	Relative error
Total	4,340	22.24	(1)
Engineers	370	1.89	(1)
Field unspecified	370	1.89	0.00
Technicians	3,970	20.35	(1)
Electrical/electronic technicians	3,830	19.64	37.81
All other engineering technicians	140	.71	(1)

See footnotes at end of table.

TABLE C-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN TRADE AND REGULATED INDUSTRIES AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRIES, AND THE RELATIVE ERROR: 1982--con.

Communication services, n.e.c. (SIC 4890)

Field	Total	Percent of industry employment	Relative error
Total	18,600	17.66	(1)
Engineers	3,170	3.01	(1)
Electrical/electronic	2,810	2.67	13.75
Industrial	160	.15	45.10
Other, n.e.c.	200	.19	.00
Scientists	290	.27	(1)
Systems analysts	290	.27	32.93
Technicians	15,140	14.38	(1)
Computer programmer	520	.49	29.67
Drafter	500	.47	17.19
Electrical/electronic technicians	12,680	12.06	9.27
Broadcast technician	1,210	1.15	27.83
All other engineering technicians	230	.21	(1)

Electric services (SIC 4910)

Field	Total	Percent of industry employment	Relative error
Total	58,450	13.93	(1)
Engineers	26,760	6.38	(1)
Chemical	660	.15	16.44
Civil	1,540	.36	9.53
Electrical/electronic	14,240	3.41	6.97
Industrial	1,430	.34	9.60
Mechanical	2,830	.67	12.13
Nuclear	1,630	.39	18.77
Other, n.e.c	4,430	1.06	.00
Scientists	4,600	1.10	(1)
Field unspecified	1,800	.43	9.01
Systems analysts	2,800	.67	11.10
Technicians	27,090	6.45	(1)
Computer programmer	2,450	.58	11.06
Drafter	3,720	.89	10.24
Electrical/electronic technicians	8,990	2.15	7.12
Surveyor	860	.20	14.50
Mechanical engineering technicians	1,060	.25	22.52
Estimator and drafter, utilities	3,710	.88	7.57
All other engineering technicians	4,200	1.00	(1)
Science technicians	2,100	.50	9.35

See footnotes at end of table.

TABLE C-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN TRADE AND REGULATED INDUSTRIES AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRIES, AND THE RELATIVE ERROR: 1982--con.

Gas production and distribution (SIC 4920)

Field	Total	Percent of industry em- ploy- ment	Relative error
Total	12,060	6.84	(1)
Engineers	3,850	2.19	(1)
Chemical	280	.16	25.93
Civil	1,120	.64	9.89
Electrical/electronic	280	.16	18.27
Industrial	310	.17	17.71
Mechanical	670	.38	10.55
Other, n.e.c.	1,190	.68	.00
Scientists	1,590	.90	(1)
Field unspecified	540	.30	15.93
Systems analysts	1,050	.60	9.68
Technicians	6,620	3.75	(1)
Computer programmer	1,220	.69	10.28
Drafter	1,890	1.08	6.76
Electrical/electronic technicians	1,200	.68	14.36
Surveyor	280	.16	12.06
Mechanical engineering technicians	260	.14	21.00
Estimator and drafter, utilities	150	.08	19.23
All other engineering technicians	1,350	.77	(1)
Science technicians	270	.15	17.99

Combination electric and gas, and other utilities (SIC 4930)

Field	Total	Percent of industry em- ploy- ment	Relative error
Total	24,580	12.26	(1)
Engineers	11,210	5.60	(1)
Chemical	240	.12	23.36
Civil	940	.47	18.57
Electrical/electronic	4,320	2.16	11.23
Industrial	460	.23	22.57
Mechanical	1,400	.70	19.15
Nuclear	590	.29	16.11
Other, n.e.c.	3,260	1.63	.00
Scientists	2,370	1.18	(1)
Field unspecified	510	.25	16.41
Systems analysts	1,860	.93	14.91
Technicians	11,000	5.48	(1)
Computer programmer	1,390	.69	12.90
Drafter	1,470	.73	18.77
Electrical/electronic technicians	3,060	1.53	13.53
Surveyor	260	.13	12.80
Mechanical engineering technicians	110	.05	35.81
Estimator and drafter, utilities	2,240	1.12	14.67
All other engineering technicians	2,170	1.08	(1)
Science technicians	300	.15	19.47

See footnotes at end of table.

TABLE C-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN TRADE AND REGULATED INDUSTRIES AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRIES, AND THE RELATIVE ERROR: 1982--con.

Water supply (SIC 4940)

Field	Total	Percent of industry employment	Relative error
Total	520	2.48	(1)
Engineers	210	1.01	(1)
Civil	210	1.01	16.62
Scientists	60	.28	(1)
Field unspecified	60	.28	15.22
Technicians	250	1.19	(1)
Drafter	100	.48	14.19
All other engineering technicians	90	.43	(1)
Science technicians	60	.28	19.69

Sanitary services (SIC 4950)

Field	Total	Percent of industry employment	Relative error
Total	800	1.56	(1)
Engineers	530	1.05	(1)
Field unspecified	530	1.05	0.00
Scientists	110	.21	(1)
Field unspecified	110	.21	23.12
Technicians	160	.30	(1)
Drafter	70	.13	37.68
Science technicians	90	.17	39.00

See footnotes at end of table.

TABLE C-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN TRADE AND REGULATED INDUSTRIES AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRIES, AND THE RELATIVE ERROR: 1982--con.

Motor vehicles and auto parts and supplies (SIC 5010)

Field	Total	Percent of industry employment	Relative error
Total	4,280	1.00	(1)
Engineers	1,740	.42	(1)
Mechanical	1,390	.34	26.66
Other, n.e.c.	350	.08	.00
Scientists	640	.14	(1)
Mathematical scientists	80	.01	(1)
Systems analysts	560	.13	16.72
Technicians	1,900	.44	(1)
Computer programmer	600	.14	13.12.
Electrical/electronic technicians	1,100	.26	27.32
All other engineering technicians	200	.04	(1)

Furniture and home furnishings (SIC 5020)

Field	Total	Percent of industry employment	Relative error
Total	430	0.37	(1)
Scientists	70	.06	(1)
Systems analysts	70	.06	43.36
Technicians	360	.31	(1)
Computer programmer	130	.11	31.26
Engineering technicians	230	.20	.00

See footnotes at end of table.

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TABLE C-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN TRADE AND REGULATED INDUSTRIES AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRIES, AND THE RELATIVE ERROR: 1982--con.

Lumber and other construction materials (SIC 5030)

Field	Total	Percent of industry employment	Relative error
Total	1,460	0.78	(1)
Engineers	370	.20	(1)
Field unspecified	370	.20	0.00
Scientists	140	.06	(1)
Physical scientists	70	.03	(1)
Systems analysts	70	.03	35.88
Technicians	950	.52	(1)
Computer programmer	290	.16	22.44
Drafter	490	.27	30.05
All other engineering technicians	170	.09	(1)

Sporting, toy, photographic, and hobby goods (SIC 5040)

Field	Total	Percent of industry employment	Relative error
Total	1,770	2.42	(1)
Engineers	70	.09	(1)
Field unspecified	70	.09	0.00
Technicians	1,700	2.33	(1)
Computer programmer	200	.27	23.05
Electrical/electronic technicians	1,500	2.06	26.99

See footnotes at end of table.

TABLE C-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN TRADE AND REGULATED INDUSTRIES AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRIES, AND THE RELATIVE ERROR: 1982--con.

Metals and minerals, except petroleum (SIC 5050)

Field	Total	Percent of industry employment	Relative error
Total	2,800	1.93	(1)
Engineers	1,060	.73	(1)
Mechanical	170	.11	35.36
Other, n.e.c.	890	.62	.00
Scientists	260	.18	(1)
Systems analysts	260	.18	19.20
Technicians	1,480	1.02	(1)
Computer programmer	340	.23	17.01
Drafter	700	.49	23.58
Electrical/electronic technicians	370	.26	24.04
All other engineering technicians	70	.04	(1)

Electrical goods (SIC 5060)

Field	Total	Percent of industry employment	Relative error
Total	43,160	9.94	(1)
Engineers	9,520	2.19	(1)
Electrical/electronic	6,600	1.52	18.19
Mechanical	960	.22	31.79
Other, n.e.c.	1,960	.45	.00
Scientists	1,000	.22	(1)
Mathematical scientists	240	.05	(1)
Systems analysts	760	.17	25.71
Technicians	32,640	7.53	(1)
Computer programmer	1,210	.27	31.29
Drafter	800	.18	29.35
Electrical/electronic technicians	30,100	6.96	8.04
All other engineering technicians	530	.12	(1)

See footnotes at end of table.

TABLE C-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN TRADE AND REGULATED INDUSTRIES AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRIES, AND THE RELATIVE ERROR: 1982--con.

Hardware/plumbing/heating equipment and supplies (SIC 5070)

Field	Total	Percent of industry employment	Relative error
Total	4,910	2.04	(1)
Engineers	1,860	.78	(1)
Mechanical	1,230	.52	29.71
Other, n.e.c	630	.26	.00
Scientists	280	.11	(1)
Systems analysts	280	.11	15.04
Technicians	2,770	1.15	(1)
Computer programmer	410	.17	14.26
Drafter	230	.09	35.81
Electrical/electronic technicians	1,930	.81	23.20
All other engineering technicians	200	.08	(1)

Machinery, equipment, and supplies (SIC 5080)

Field	Total	Percent of industry employment	Relative error
Total	113,850	8.37	(1)
Engineers	16,180	1.18	(1)
Electrical/electronic	4,930	.36	18.06
Mechanical	4,700	.34	16.00
Other, n.e.c	6,550	.48	.00
Scientists	19,040	1.40	(1)
Mathematical scientists	280	.02	(1)
Chemists	140	.01	38.31
Systems analysts	18,620	1.37	15.55
Technicians	78,630	5.79	(1)
Computer programmer	12,090	.89	16.30
Drafter	2,610	.19	14.15
Electrical/electronic technicians	59,810	4.42	7.10
Mechanical engineering technicians	1,110	.08	31.45
All other engineering technicians	1,990	.14	(1)
Science technicians	1,020	.07	.00

See footnotes at end of table.

TABLE C-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN TRADE AND REGULATED INDUSTRIES AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRIES, AND THE RELATIVE ERROR: 1982--con.

Miscellaneous durable goods (SIC 5090)

Field	Total	Percent of industry em-ploy-ment	Relative error
Total	1,820	0.97	(1)
Engineers	820	.44	(1)
Field unspecified	820	.44	0.00
Scientists	120	.06	(1)
Systems analysts	120	.06	27.36
Technicians	880	.47	(1)
Computer programmer	130	.07	25.61
Electrical/electronic technicians	670	.36	48.50
All other engineering technicians	80	.04	(1)

Paper and paper products (SIC 5110)

Field	Total	Percent of industry em-ploy-ment	Relative error
Total	1,070	0.66	(1)
Engineers	190	.12	(1)
Field unspecified	190	.12	0.00
Scientists	90	.05	(1)
Systems analysts	90	.05	30.96
Technicians	790	.49	(1)
Computer programmer	250	.15	21.22
Electrical/electronic technicians	540	.34	32.13

See footnotes at end of table.

TABLE C-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN TRADE AND REGULATED INDUSTRIES AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRIES, AND THE RELATIVE ERROR: 1982--con.

Drugs, proprietaries, and sundries (SIC 5120)

Field	Total	Percent of industry em- ploy- ment	Relative error
Total	1,380	0.85	(1)
Engineers	180	.11	(1)
Field unspecified	180	.11	0.00
Scientists	300	.18	(1)
Chemists	150	.09	39.94
Systems analysts	150	.09	16.17
Technicians	900	.56	(1)
Computer programmer	390	.25	15.95
Electrical/electronic technicians	220	.14	45.55
All other engineering technicians	200	.12	(1)
Science technicians	90	.05	.00

Apparel, piece goods, and notions (SIC 5130)

Field	Total	Percent of industry em- ploy- ment	Relative error
Total	730	0.41	(1)
Engineers	90	.05	(1)
Field unspecified	90	.05	0.00
Scientists	160	.09	(1)
Systems analysts	160	.09	20.52
Technicians	480	.27	(1)
Computer programmer	280	.16	26.46
Engineering technicians	200	.11	.00

See footnotes at end of table.

TABLE C-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN TRADE AND REGULATED INDUSTRIES AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRIES, AND THE RELATIVE ERROR: 1982--con.

Groceries and related products (SIC 5140)

Field	Total	Percent of industry em-ployment	Relative error
Total	3,430	0.47	(1)
Engineers	340	.04	(1)
Mechanical	190	.02	47.64
Other, n.e.c	150	.02	.00
Scientists	770	.10	(1)
Physical scientists	160	.02	(1)
Life scientists	100	.01	(1)
Systems analysts	510	.07	30.26
Technicians	2,320	.33	(1)
Computer programmer	1,240	.18	24.90
Drafter	90	.01	45.49
Electrical/electronic technicians	570	.08	31.04
Science technicians	420	.06	.00

Farm-product raw materials (SIC 5150)

Field	Total	Percent of industry em-ployment	Relative error
Total	840	0.59	(1)
Engineers	80	.05	(1)
Field unspecified	80	.05	0.00
Scientists	400	.29	(1)
Life scientists	400	.29	(1)
Technicians	360	.25	(1)
Computer programmer	170	.12	34.36
Electrical/electronic technicians	130	.09	21.59
All other engineering technicians	60	.04	(1)

See footnotes at end of table.

TABLE C-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN TRADE AND REGULATED INDUSTRIES AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRIES, AND THE RELATIVE ERROR: 1982--con.

Chemicals and allied products (SIC 5160)

Field	Total	Percent of industry employment	Relative error
Total	4,580	3.35	(1)
Engineers	1,340	.98	(1)
Mechanical	240	.17	44.44
Other, n.e.c	1,100	.81	.00
Scientists	870	.64	(1)
Chemists	760	.56	19.95
Systems analysts	110	.08	20.61
Technicians	2,370	1.73	(1)
Computer programmer	160	.11	19.41
Electrical/electronic technicians	760	.56	24.92
All other engineering technicians	240	.17	(1)
Science technicians	1,210	.89	34.84

Petroleum and petroleum products (SIC 5170)

Field	Total	Percent of industry employment	Relative error
Total	3,260	1.37	(1)
Engineers	970	.42	(1)
Chemical	120	.05	30.71
Mechanical	140	.06	24.11
Other, n.e.c	710	.31	.00
Scientists	880	.37	(1)
Mathematical scientists	280	.12	(1)
Chemists	140	.06	39.93
All other physical scientists	130	.05	.00
Systems analysts	330	.14	22.43
Technicians	1,410	.58	(1)
Computer programmer	340	.14	21.02
Drafter	110	.04	26.54
Electrical/electronic technicians	630	.27	22.45
All other engineering technicians	180	.07	(1)
Science technicians	150	.06	33.93

See footnotes at end of table.

TABLE C-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN TRADE AND REGULATED INDUSTRIES AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRIES, AND THE RELATIVE ERROR: 1982--con.

Beer, wine, and distilled alcoholic beverages (SIC 5180)

Field	Total	Percent of industry employment	Relative error
Total	930	0.61	(1)
Scientists	360	.23	(1)
Chemists	190	.12	41.02
Systems analysts	170	.11	38.97
Technicians	570	.38	(1)
Computer programmer	570	.38	26.41

Miscellaneous nondurable goods (SIC 5190)

Field	Total	Percent of industry employment	Relative error
Total	3,200	0.78	(1)
Engineers	120	.03	(1)
Field unspecified	120	.03	0.00
Scientists	1,230	.30	(1)
Mathematical scientists	160	.04	(1)
Chemists	240	.06	45.49
Life scientists	500	.12	(1)
Systems analysts	330	.08	30.83
Technicians	1,850	.45	(1)
Computer programmer	680	.17	18.43
Electrical/electronic technicians	740	.18	33.97
Science technicians	430	.10	43.81

See footnotes at end of table.

TABLE C-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN TRADE AND REGULATED INDUSTRIES AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRIES, AND THE RELATIVE ERROR: 1982--con.

Lumber and other building materials dealers (SIC 5210)

Field	Total	Percent of industry em- ploy- ment	Relative error
Total	580	0.18	(1)
Engineers	100	.03	(1)
Field unspecified	100	.03	0.00
Technicians	480	.15	(1)
Computer programmer	100	.03	20.50
Drafter	380	.12	27.46

Department stores (SIC 5310)

Field	Total	Percent of industry em- ploy- ment	Relative error
Total	4,060	0.19	(1)
Engineers	390	.02	(1)
Field unspecified	390	.02	0.00
Scientists	1,210	.06	(1)
Statistician	200	.01	17.07
Systems analysts	1,010	.05	20.98
Technicians	2,460	.11	(1)
Computer programmer	1,790	.09	9.76
Drafter	340	.01	21.56
Electrical/electronic technicians	330	.01	27.48

See footnotes at end of table.

TABLE C-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN TRADE AND REGULATED INDUSTRIES AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRIES, AND THE RELATIVE ERROR: 1982--con.

Variety stores (SIC 5330)

Field	Total	Percent of industry employment	Relative error
Total	520	0.21	(1)
Scientists	110	.04	(1)
Systems analysts	110	.04	48.79
Technicians	410	.17	(1)
Computer programmer	170	.07	48.88
Engineering technicians	240	.10	.00

Miscellaneous general merchandise stores (SIC 5390)

Field	Total	Percent of industry employment	Relative error
Total	150	0.12	(1)
Scientists	70	.06	(1)
Systems analysts	70	.06	28.65
Technicians	80	.06	(1)
Computer programmer	80	.06	48.84

See footnotes at end of table.

TABLE C-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN TRADE AND REGULATED INDUSTRIES AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRIES, AND THE RELATIVE ERROR: 1982--con.

Grocery stores (SIC 5410)

Field	Total	Percent of industry employment	Relative error
Total	1,770	0.06	(1)
Engineers	260	.01	(1)
Field unspecified	260	.01	0.00
Scientists	600	.02	(1)
Systems analysts	600	.02	27.95
Technicians	910	.03	(1)
Computer programmer	610	.02	17.43
Engineering technicians	300	.01	.00

Candy, nut, and confectionery stores (SIC 5440)

Field	Total	Percent of industry employment	Relative error
Total	200	0.80	(1)
Technicians	200	.80	(1)
Field unspecified	200	.80	(1)

See footnotes at end of table.

TABLE C-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN TRADE AND REGULATED INDUSTRIES AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRIES, AND THE RELATIVE ERROR: 1982--con.

Motor vehicle dealers (new and used) (SIC 5510)

Field	Total	Percent of industry employment	Relative error
Total	100	0.01	(1)
Technicians	100	.01	(1)
Field unspecified	100	.01	(1)

Auto and home supply stores (SIC 5530)

Field	Total	Percent of industry employment	Relative error
Total	240	0.09	(1)
Technicians	240	.09	(1)
Field unspecified	240	.09	(1)

See footnotes at end of table.

TABLE C-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN TRADE AND REGULATED INDUSTRIES AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRIES, AND THE RELATIVE ERROR: 1982--con.

Gasoline service stations (SIC 5540)

Field	Total	Percent of industry employment	Relative error
Total	140	0.02	(1)
Technicians	140	.02	(1)
Computer programmer	140	.02	29.84

Automotive dealers, n.e.c. (SIC 5590)

Field	Total	Percent of industry employment	Relative error
Total	150	1.45	(1)
Technicians	150	1.45	(1)
Engineering technicians	150	1.45	0.00

See footnotes at end of table.

TABLE C-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN TRADE AND REGULATED INDUSTRIES AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRIES, AND THE RELATIVE ERROR: 1982--con.

Women's ready-to-wear stores (SIC 5620)

Field	Total	Percent of industry employment	Relative error
Total	280	0.07	(1)
Scientists	90	.02	(1)
Systems analysts	90	.02	20.92
Technicians	190	.05	(1)
Computer programmer	190	.05	19.89

Family clothing stores (SIC 5650)

Field	Total	Percent of industry employment	Relative error
Total	220	0.12	(1)
Scientists	110	.06	(1)
Systems analysts	110	.06	44.98
Technicians	110	.06	(1)
Computer programmer	110	.06	36.30

See footnotes at end of table.

TABLE C-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN TRADE AND REGULATED INDUSTRIES AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRIES, AND THE RELATIVE ERROR: 1982--con.

Furniture and home furnishings, except appliances (SIC 5710)

Field	Total	Percent of industry employment	Relative error
Total	170	0.04	(1)
Technicians	170	.04	(1)
Computer programmer	70	.02	41.73
Engineering technicians	100	.02	.00

Household appliance stores (SIC 5720)

Field	Total	Percent of industry employment	Relative error
Total	130	0.17	(1)
Technicians	130	.17	(1)
Field unspecified	130	.17	(1)

See footnotes at end of table.

TABLE C-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN TRADE AND REGULATED INDUSTRIES AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRIES, AND THE RELATIVE ERROR: 1982--con.

Radio, television, and music stores (SIC 5730)

Field	Total	Percent of industry employment	Relative error
Total	1,500	0.99	(1)
Technicians	1,500	.99	(1)
Electrical/electronic technicians	1,500	.99	35.23

Eating and drinking places (SIC 5800)

Field	Total	Percent of industry employment	Relative error
Total	520	0.01	(1)
Technicians	520	.01	(1)
Computer programmer	520	.01	48.83

See footnotes at end of table.

TABLE C-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN TRADE AND REGULATED INDUSTRIES AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRIES, AND THE RELATIVE ERROR: 1982--con.

Drug stores and proprietary stores (SIC 5910)

Field	Total	Percent of industry employment	Relative error
Total	180	0.03	(1)
Scientists	60	.01	(1)
Systems analysts	60	.01	30.68
Technicians	120	.02	(1)
Computer programmer	120	.02	33.79

Liquor stores (SIC 5920)

Field	Total	Percent of industry employment	Relative error
Total	100	0.07	(1)
Technicians	100	.07	(1)
Field unspecified	100	.07	(1)

See footnotes at end of table.

TABLE C-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN TRADE AND REGULATED INDUSTRIES AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRIES, AND THE RELATIVE ERROR: 1982--con.

Miscellaneous shopping goods stores (SIC 5940)

Field	Total	Percent of industry em-ployment	Relative error
Total	440	0.06	(1)
Scientists	180	.02	(1)
Systems analysts	180	.02	32.02
Technicians	260	.04	(1)
Computer programmer	260	.04	28.88

Nonstore retailers (SIC 5960)

Field	Total	Percent of industry em-ployment	Relative error
Total	980	0.38	(1)
Engineers	140	.05	(1)
Field unspecified	140	.05	0.00
Scientists	390	.15	(1)
Statistician	190	.07	25.20
Systems analysts	200	.08	13.66
Technicians	450	.18	(1)
Computer programmer	350	.14	12.43
Engineering technicians	100	.04	.00

See footnotes at end of table.

TABLE C-3. SCIENTISTS, ENGINEERS, AND TECHNICIANS IN TRADE AND REGULATED INDUSTRIES AS A PERCENT OF TOTAL EMPLOYMENT IN THE INDUSTRIES, AND THE RELATIVE ERROR: 1982--con.

Fuel and ice dealers (SIC 5980)

Field	Total	Percent of industry employment	Relative error
Total	170	0.17	(1)
Engineers	70	.07	(1)
Field unspecified	70	.07	0.00
Technicians	100	.10	(1)
Field unspecified	100	.10	(1)

Retail stores, n.e.c. (SIC 5990)

Field	Total	Percent of industry employment	Relative error
Total	670	0.24	(1)
Technicians	670	.24	(1)
Electrical/electronic technicians	670	.24	37.19

1/ Relative error was not computed.
NOTE: Because of rounding, components may not add to totals.
SOURCES: Bureau of Labor Statistics and the National Science Foundation.

other science resources publications

Science Resources Studies Highlights

R&D Funds

	NSF No.	Price
"Despite Recession, Companies' Own R&D Funding Rose 13% During 1982"	84-314	-----
"Non-Federal Funding for Academic R&D Activities Increased at a Faster Pace Than Federal Funding in Fiscal Year 1982"	84-307	-----
"Federal Academic Obligations Increased by 13% in 1982, 5% in Real Dollars"	84-305	-----
"Real Growth in Federal R&D Funds Estimated at 12% in 1984--Largest Increase Since Midsixties"	84-302	-----
"Dollar Value of U.S. R&D Expenditures Overseas Declined in 1982"	83-329	-----
"Companies Plan Increase in R&D Spending Through 1984"	83-327	-----

S/E Personnel

	NSF No.	Price
"Science and Engineering Employment in Academia Grew 3% in 1983"	84-317	-----
"Graduate Science/Engineering Enrollment Grew by 2% Between Fall 1981 and 1982, With Computer Sciences, Up 20%, Leading Growth"	84-313	-----
"One-fourth of Academic Research Equipment Classified Obsolete"	84-312	-----
"1982 Job Market for New Science and Engineering Graduates About the Same as That of Previous Years"	84-310	-----
"Industry Reports Shortages of Scientists and Engineers Down Substantially From 1982 to 1983"	84-303	-----
"Doctorate Production in 1982 Stable in Science/Engineering Fields, But Down in Science and Mathematics Education"	83-330	-----
"No Change in Science and Engineering Student Quality Seen by 60% of Academic Officials: At Least 25% Improvement"	83-322	-----
"Growth in Neuroscience May Be Leveling Off"	83-314	-----

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	NSF No.	Price
Academic Science/Engineering: R&D Funds, Fiscal Year 1982	84-308	-----
Research and Development in Industry, 1981. Funds, 1981; Scientists and Engineers, January 1982	83-325	-----
Federal Funds for Research and Development, Fiscal Years 1982, 1983, and 1984, Volume XXXII	83-319	-----

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	NSF No.	Price
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Academic Science/Engineering: Scientists and Engineers, January 1983	84-309	-----
Academic Science/Engineering: Graduate Enrollment and Support, Fall 1982	84-306	-----
Science and Engineering Doctorates: 1960-82	83-328	-----
Characteristics of Doctoral Scientists and Engineers in the United States: 1981	82-332	-----

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R&D Funds

	NSF No.	Price
Federal R&D Funding by Budget Function: Fiscal Years 1983-85	84-316	-----
Federal Support to Universities, Colleges, and Selected Nonprofit Institutions, Fiscal Year 1982	84-315	-----
Federal Funds for Research and Development, Fiscal Years 1981, 1982, and 1983, Volume XXXI	83-320	$2.50

S/E Personnel

	NSF No.	Price
Projected Response of the Science, Engineering, and Technical Labor Market to Defense and Nondefense Needs: 1982-84	84-304	-----
Women and Minorities in Science and Engineering	84-300	-----

Composite

	NSF No.	Price
Academic Science/Engineering: 1972-83, R&D Funds, Scientists and Engineers, Graduate Enrollment and Support	84-322	In press
National Patterns of Science and Technology Resources: 1984	84-311	-----
A Guide to NSF Science/Engineering Resources Data	84-301	-----
Science and Technology	83-318	-----
Science and Engineering Personnel: A National Overview	82-318	$5.00